

A Comparison of Visual Analog and Graphic Rating Scales in Web-based Surveys

Randall K. Thomas

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Introduction

In visually presented, self-administered surveys, one of the earliest techniques to measure attitudes was the Visual Analog Scale (Hayes and Patterson, 1921).

This technique presents a line to respondents that is anchored at either end with semantic labels on the outside of the line. Respondents mark the line at the point that best reflects their degree of attitude or experience regarding the dimension of judgment.

Since its inception, the VAS has been extensively used in all areas of attitude measurement, but has become a preferred technique for assessment of physiological experience, and not just for attitudinal measurement.

Introduction

The Graphic Rating Scale was reported in used shortly after the VAS (Freyd, 1923).

The GRS presents a line similar to the VAS, but rather than anchoring only the endpoints of the dimension of judgment, it anchors the regions of the line with graded semantic labels. These anchors provide respondents with the meaning differences along the visual line.

While the GRS has continued to retain some popularity for attitude measurement in a variety of areas of research, one of the most common uses of the GRS today is in performance appraisals in organizational settings.

Introduction

How important is price in determining at which grocery store you shop? Place an 'X' on the line that best reflects your attitude.

VAS:



GRS:



Introduction

In their paper-pencil format, both the VAS and GRS techniques require that respondents place a mark on the line at the point that best reflects their attitudes.

Researchers were required to code respondents' marks by measuring the distance of the respondent's mark from one endpoint in order to assign a scale value to the respondent.

The development of web-based surveys allows for a number of different forms of response entry and attitude measurement. Implementing the VAS and GRS techniques by way of computer allow for easier recording of respondent reactions.

Scale Experiment Method

Respondents

- **12,098 respondents from the U.S. and 18 years of age or older from an online panel completed an online survey.**
- **5934 Males – average age = 47.9**
- **6164 Females – average age = 46.4**

Topic Assignment

Respondents were randomly assigned to one topic:

- **Political issues**
 - **For the national priorities listed below, how important should each be to the national government?**

- **Grocery store facets**
 - **For the aspects of a grocery store listed below, how important would each be in determining at which grocery store you would shop?**

Element Differentiation

Within the topic, and based on previous research that established scale values of the importance of the elements, respondents were randomly assigned to receive elements that were either:

- **Easy to differentiate** (elements varied with regard to their importance)
- **Harder to differentiate** (all elements were higher in importance)

Element Differentiation

Element	Political - Hard to Differentiate	Political - Easy to Differentiate
1	Military and defense	Military and defense
2	Education	Education
3	Health care	Mass transportation systems
4	Police and crime prevention	Disaster preparation
5	Retirement and pension programs	Foreign aid to other nations

Element	Grocery Stores - Hard to Differentiate	Grocery Stores - Easy to Differentiate
1	Lower prices of products than competitors	Lower prices of products than competitors
2	Very fast checkouts	Very fast checkouts
3	Great customer service	Large frozen food selection
4	Large selection of fresh fruits and vegetables	Large selection of items for baking
5	Very convenient store location	Extensive magazine and newspaper selection

Scale Type

Respondents were then randomly assigned to one of 8 scale types:

- **Graphic Rating Scale – 5 segments**
- **Visual Analog Scale – 5 segments**
- **Visual Analog Scale – 2 segments (midpoint)**
- **Visual Analog Scale – no segment**
- **Horizontal Fully Anchored Scale – radio buttons**
- **Horizontal End Anchored Scale – radio buttons**
- **Numeric box rating scale – Fully Anchored**
- **Numeric box rating scale – End Anchored**

Criterion Assessment

After rating the importance of each element, respondents were asked a likelihood measure in a grid format that was topic related:

▪ **Political Issues:**

- **For the national priorities listed below, if you were to vote for spending on each priority, how likely would you be to vote for a spending increase by the national government for each specific priority?**

▪ **Grocery Stores:**

- **For the aspects listed below that a grocery store might have, how likely would that aspect determine at which particular grocery store you would shop?**

Examples of Scales

VAS no segment

Next, we'd like to change topics and ask you a few questions about grocery stores.

For the aspects of a grocery store listed below, how important would each be in determining at which grocery store you would shop?

On the lines below, click on the position that best reflects how important you consider each to be.

Lower prices of products than competitors

Not at all important |-----| Absolutely essential

Large selection of fresh fruits and vegetables

Not at all important |-----| Absolutely essential

Very fast checkouts

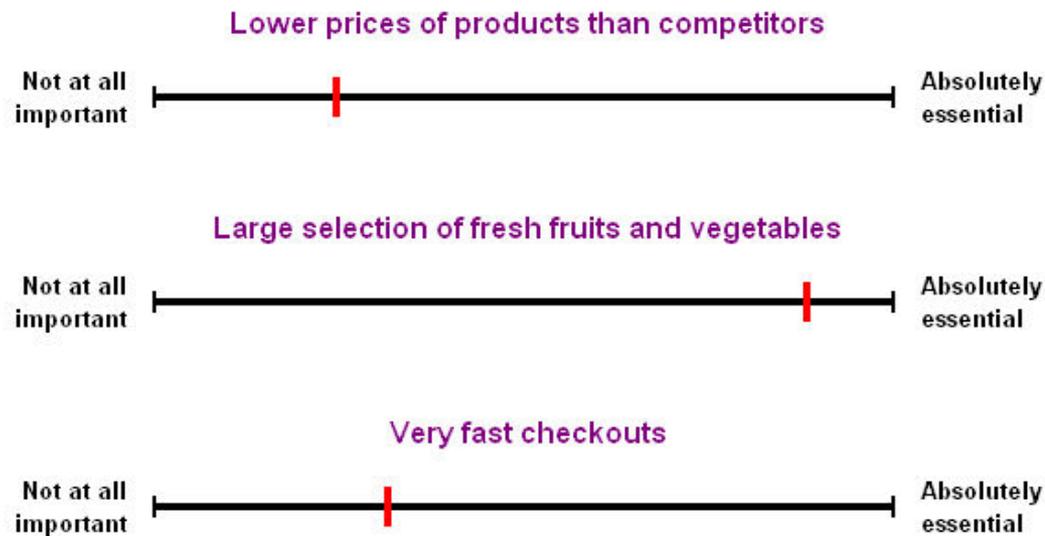
Not at all important |-----| Absolutely essential

VAS no segment

Next, we'd like to change topics and ask you a few questions about grocery stores.

For the aspects of a grocery store listed below, how important would each be in determining at which grocery store you would shop?

On the lines below, click on the position that best reflects how important you consider each to be.

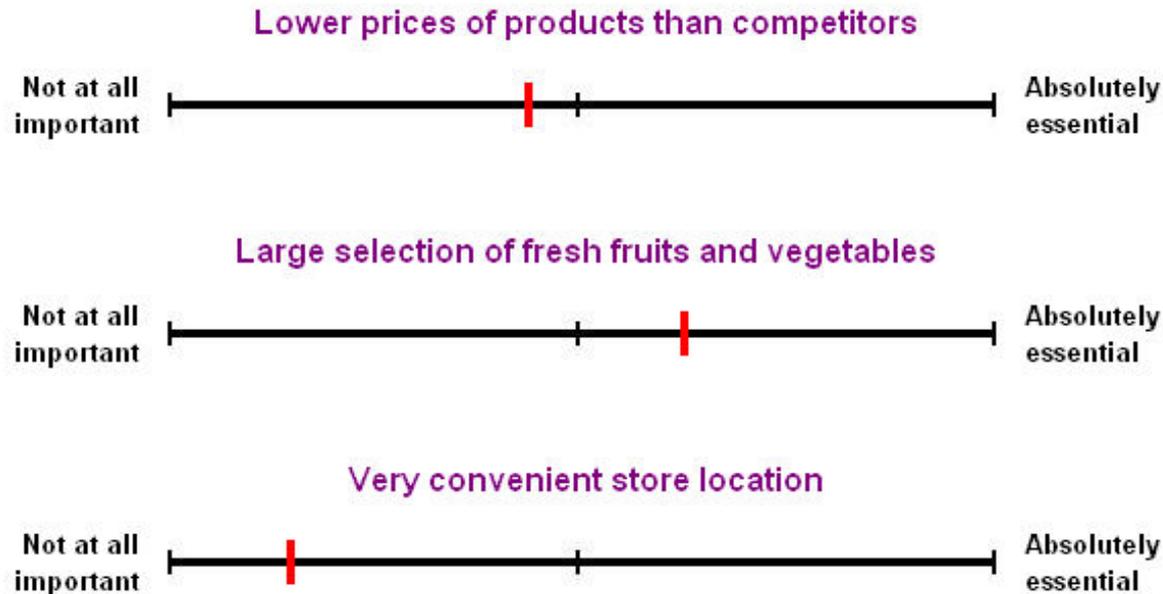


VAS 2 segment

Next, we'd like to change topics and ask you a few questions about grocery stores.

For the aspects of a grocery store listed below, how important would each be in determining at which grocery store you would shop?

On the lines below, click on the position that best reflects how important you consider each to be.

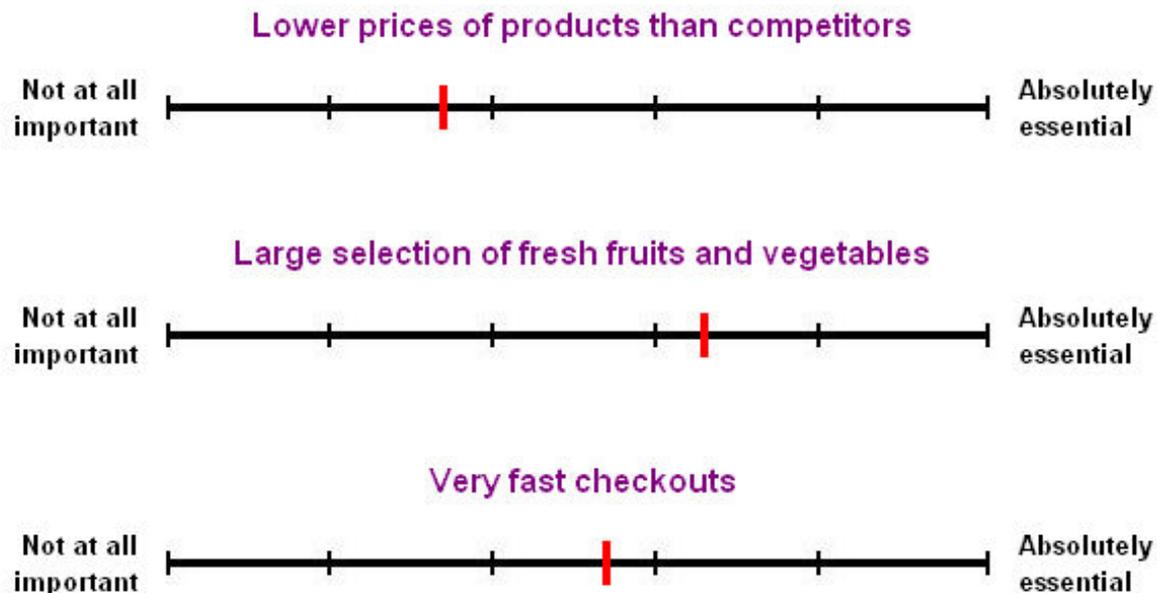


VAS 5 segment

Next, we'd like to change topics and ask you a few questions about grocery stores.

For the aspects of a grocery store listed below, how important would each be in determining at which grocery store you would shop?

On the lines below, click on the position that best reflects how important you consider each to be.



Graphic Rating Scale

Next, we'd like to change topics and ask you a few questions about grocery stores.

For the aspects of a grocery store listed below, how important would each be in determining at which grocery store you would shop?

On the lines below, click on the position that best reflects how important you consider each to be.

Lower prices of products than competitors



Large selection of fresh fruits and vegetables



Very convenient store location



Horizontal Fully-anchored

Next, we'd like to change topics and ask you a few questions about grocery stores.

For the aspects of a grocery store listed below, how important would each be in determining at which grocery store you would shop?

Lower prices of products than competitors

<input type="radio"/>				
Not at all important	Somewhat important	Important	Very important	Absolutely essential

Large selection of fresh fruits and vegetables

<input type="radio"/>				
Not at all important	Somewhat important	Important	Very important	Absolutely essential

Very convenient store location

<input type="radio"/>				
Not at all important	Somewhat important	Important	Very important	Absolutely essential

Numeric Fully-anchored

Next, we'd like to change topics and ask you a few questions about grocery stores.

For the aspects of a grocery store listed below, how important would each be in determining at which grocery store you would shop? Please enter a number ranging from 1 to 5 where "1" means "Not at all important" and "5" means "Absolutely essential".

- 1 = Not at all important
- 2 = Somewhat important
- 3 = Important
- 4 = Very important
- 5 = Absolutely essential

	Rating
Lower prices of products than competitors	<input type="text"/>
Large selection of fresh fruits and vegetables	<input type="text"/>
Very convenient store location	<input type="text"/>
Great customer service	<input type="text"/>
Very fast checkouts	<input type="text"/>

Numeric End-anchored

Next, we'd like to change topics and ask you a few questions about grocery stores.

For the aspects of a grocery store listed below, how important would each be in determining at which grocery store you would shop? Please enter a number ranging from 1 to 5 where "1" means "Not at all important" and "5" means "Absolutely essential".

1 = Not at all important

2

3

4

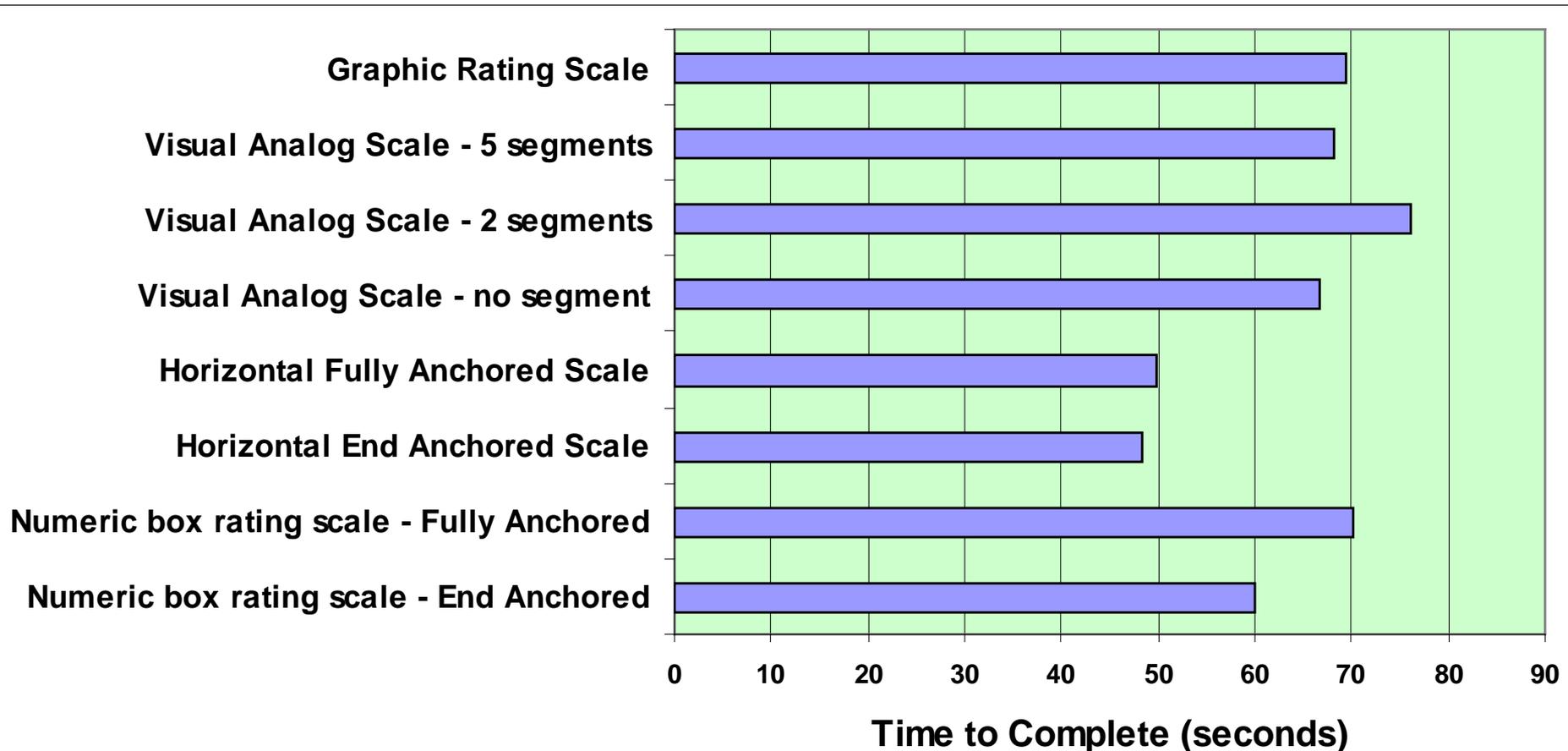
5 = Absolutely essential

	Rating
Lower prices of products than competitors	<input type="text"/>
Large selection of fresh fruits and vegetables	<input type="text"/>
Very convenient store location	<input type="text"/>
Great customer service	<input type="text"/>
Very fast checkouts	<input type="text"/>

Results

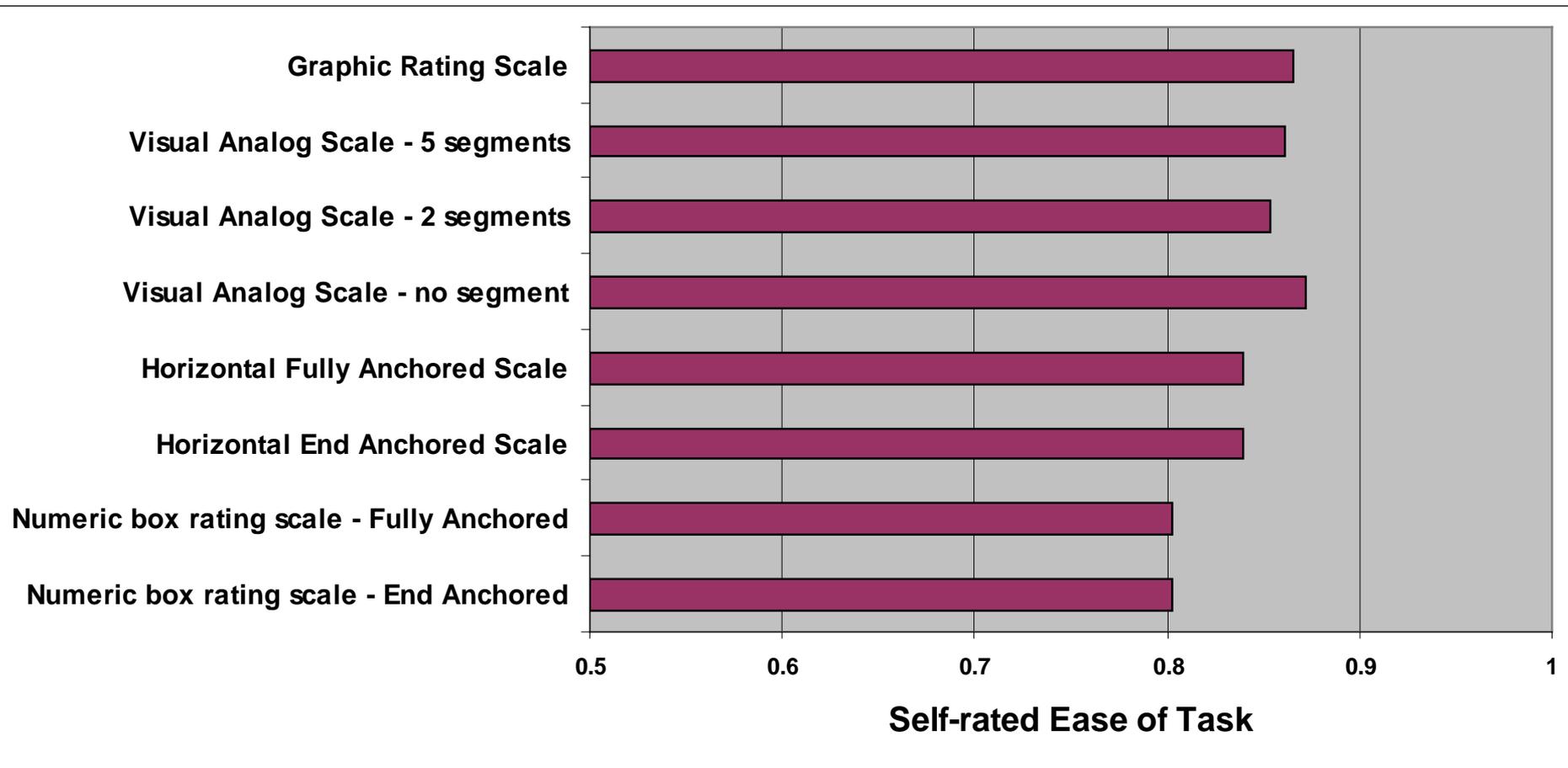
Time to Complete

Horizontal radio button scales took less time than all other scales, and fully anchored scales took longer to complete.



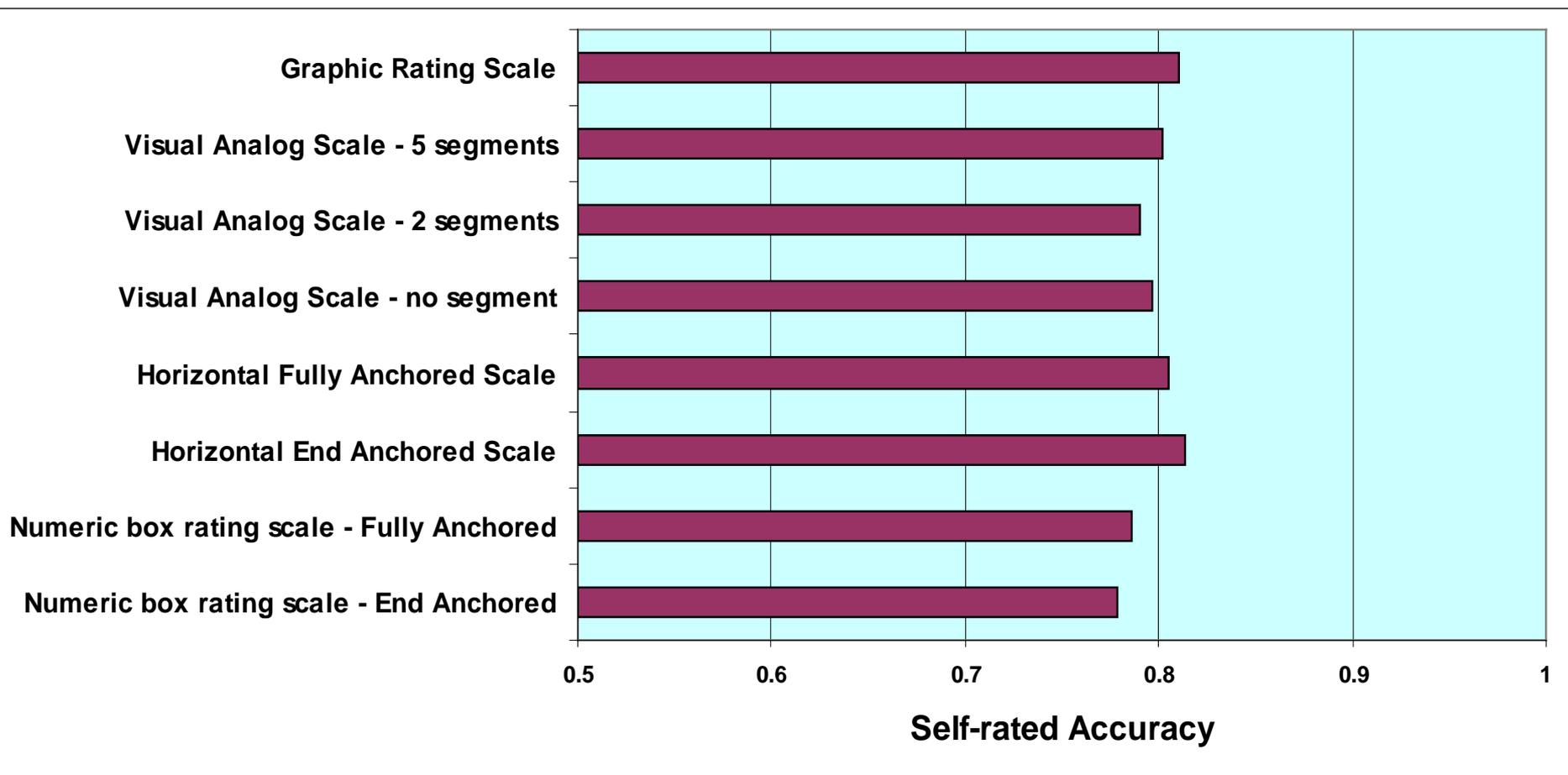
Self-rated Ease of Use

Numeric box scales were seen as less easy to use than either the radio button scales or the VAS and GRS scales.



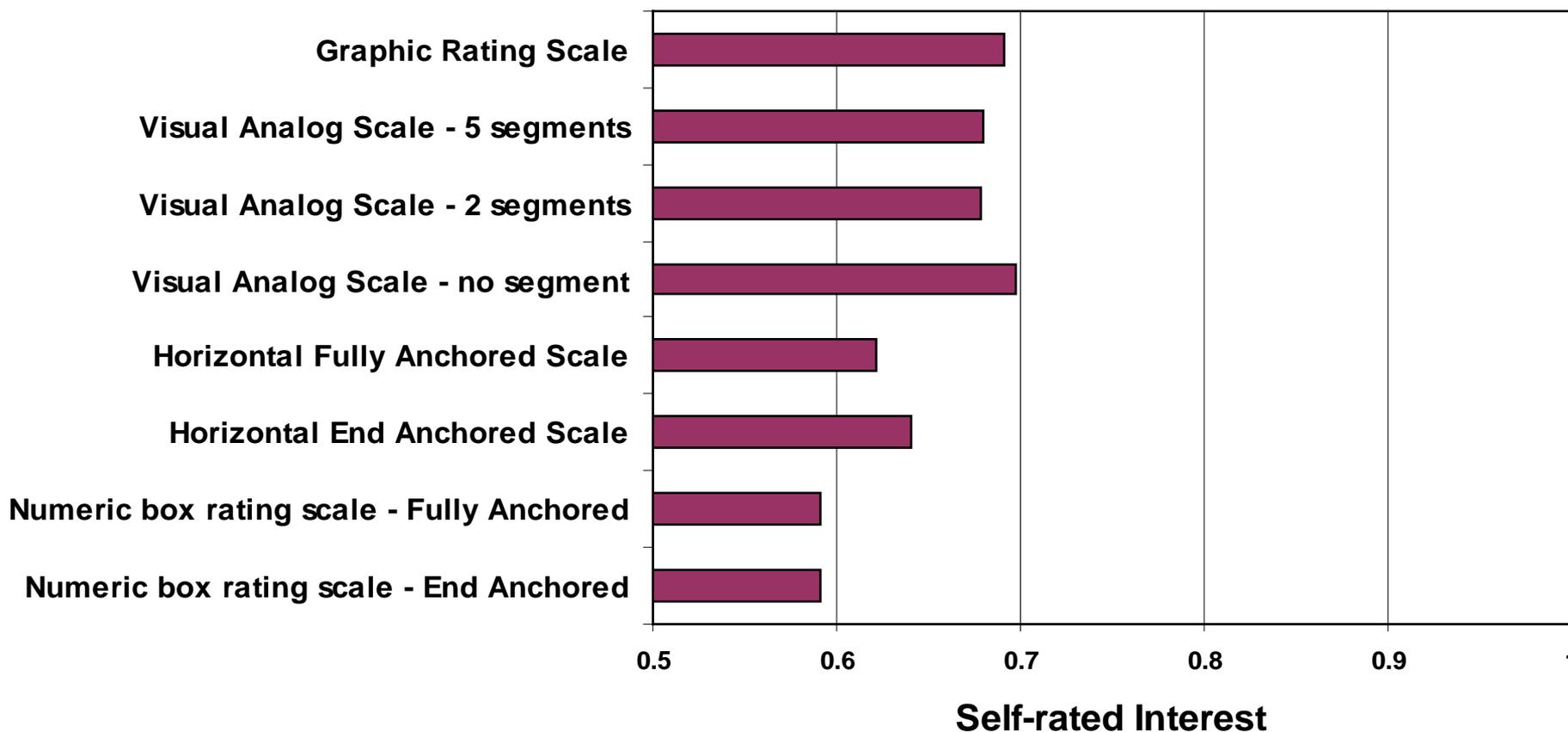
Self-rated Accuracy

Respondents felt they were a little less accurate using numeric box entry.



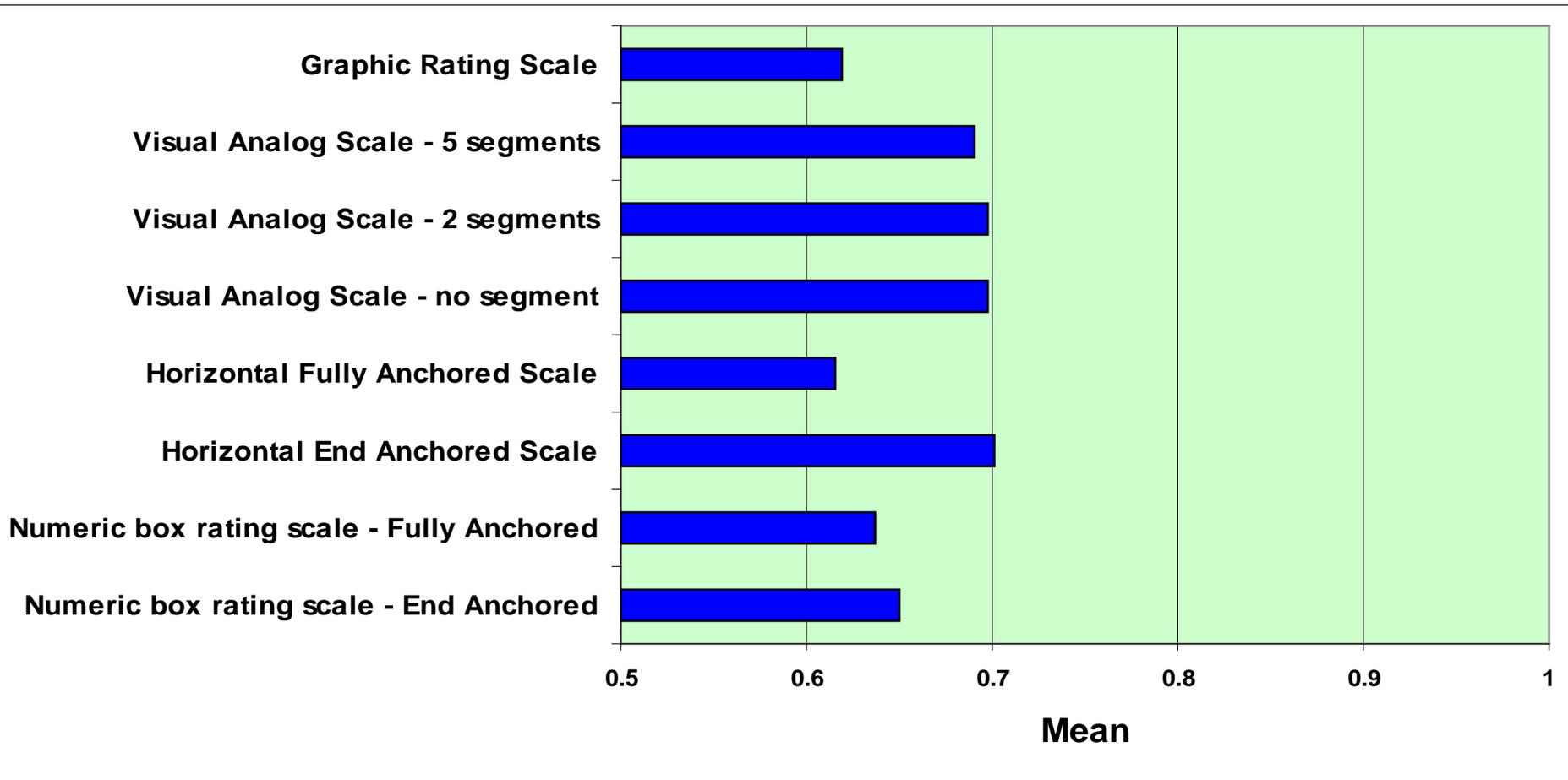
Self-rated Interest

The numeric box was rated as less interesting than the radio button scales, VAS and GRS scales were most interesting.



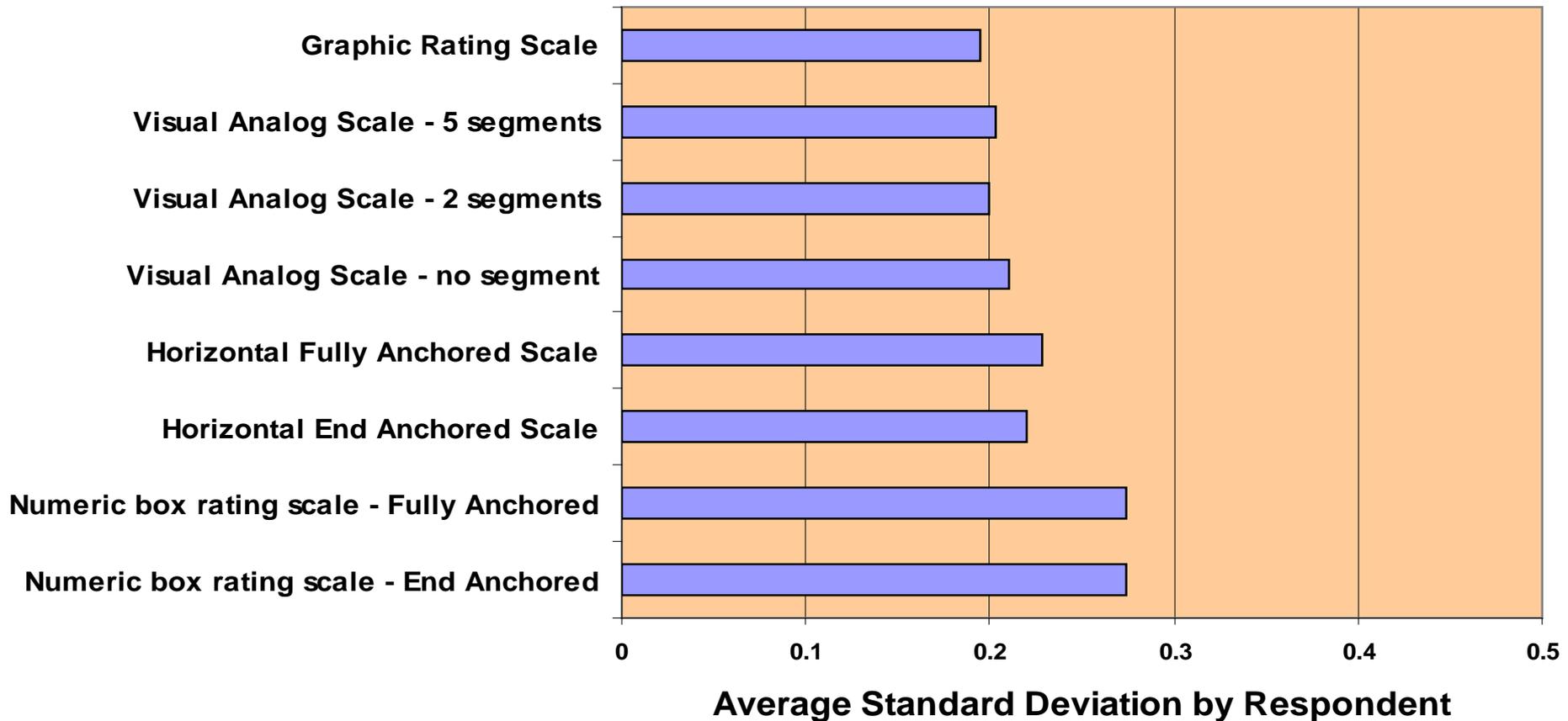
Item Means

As found in other research, fully-anchored scales yielded lower mean values than end-anchored scales.



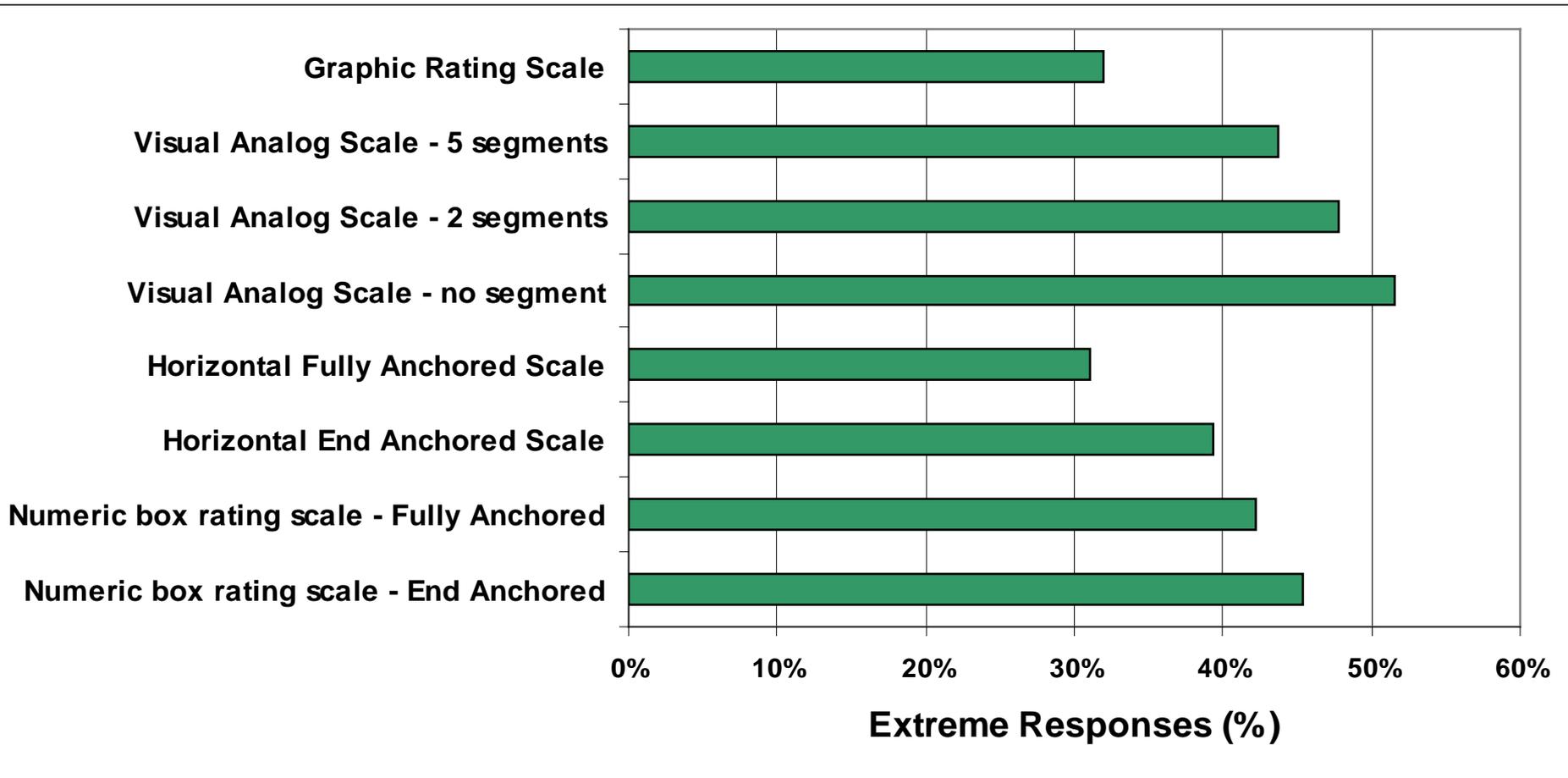
Average Standard Deviations

Looking across items by respondent, numeric box scales had a higher average variance across items.



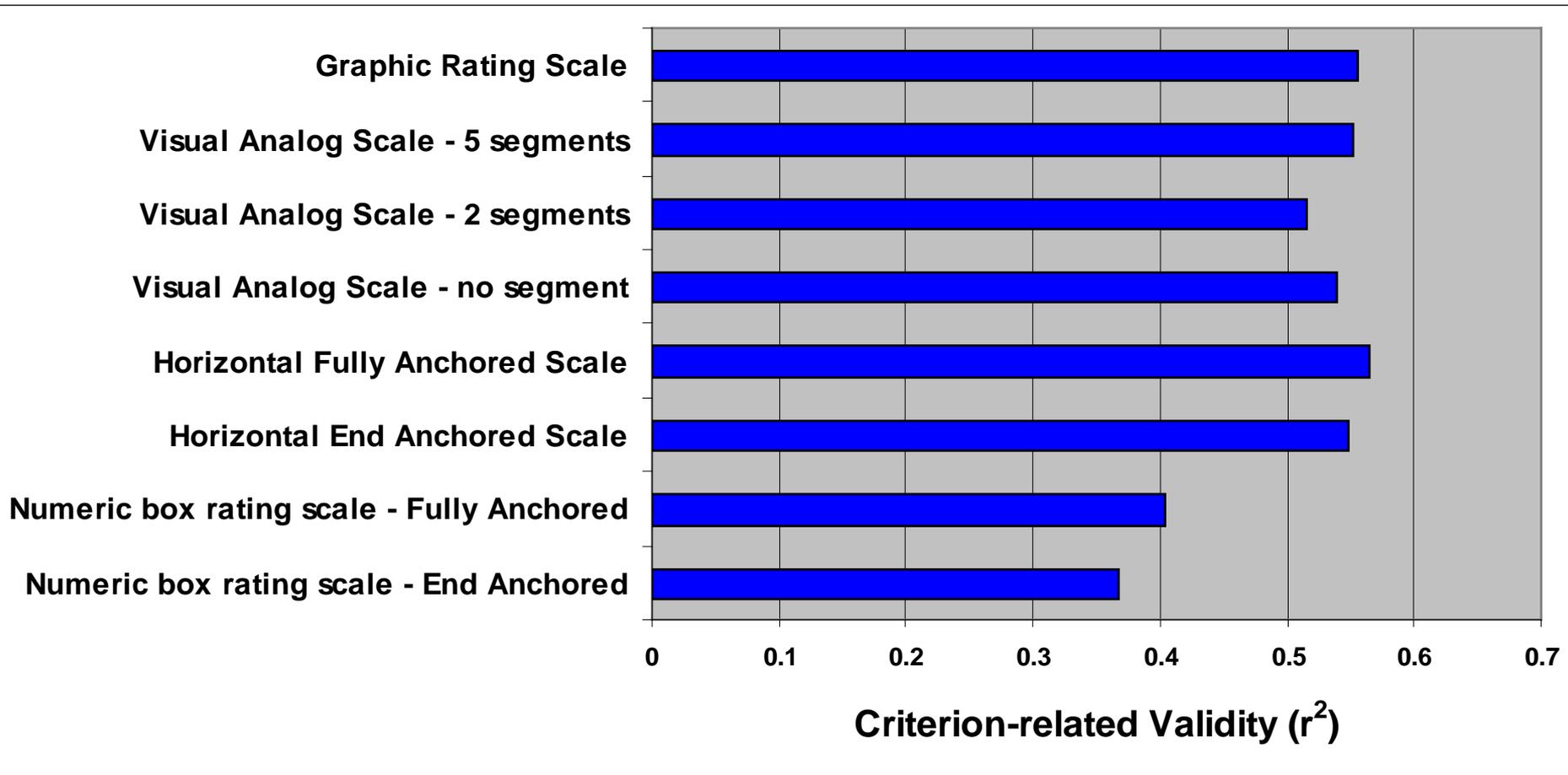
Extreme Responses

Fully-anchored scales had a lower proportion of respondents endorsing the extremes of the scale (% > +/- .3 from midpoint).



Criterion-related Validity

Numeric box scales appeared to have lower validity than radio button, VAS, and GRS scales.



Conclusions

The choice of response entry can have significant implications.

- **Fully-anchored response categories function very differently from end-anchored response categories.**
- **Numeric box entry has different properties than point-and-click modalities (radio buttons, VAS, GRS) in terms of higher variance, lower validity, and less positive respondent reactions.**

Conclusions

While taking longer than the horizontal scales, the VAS were seen as about as accurate, easy, and more interesting than the other scales.

With regard to criterion-related validity, we found that the VAS scales weren't any better than the horizontal scales, but the numeric box entry format did not fare as well.

Generally VAS scales can be used without many problems and they have acceptable levels of validity.

Thank You!

For further information:

rthomas@icfi.com

703-934-3988